

APPLICATION  
FOR  
UNITED STATES LETTERS PATENT

TITLE: SHOE

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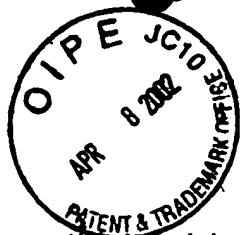
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## Shoe

### TECHNICAL FIELD

This application claims benefit of U.S. Provisional Application No. 60/253,286, filed November 27, 2000, the complete disclosure of which is incorporated herein by reference.

This invention relates to a shoe, and in particular, a shoe constructed using a vulcanization process.

### BACKGROUND

A typical shoe constructed using a vulcanization process includes a heavy molded rubber outsole and an upper for receiving the foot of a wearer. In such a shoe, the outsole has a flat upper surface, which is placed against a flat base portion of the upper, e.g., an insole board. To construct such a shoe, the upper is formed on and around a non-reactive mold known as a last. The last for this type of shoe has a flat bottom corresponding to the flat base portion of the upper. A foxing material, i.e., a strip of uncured rubber, is wrapped around the outside of the shoe along a seam created by the upper placed against the outsole, such that portions of the foxing material contact both the upper and the outsole across the seam. The shoe, including the last and the wrapped foxing material, is exposed to a vulcanization process, e.g., heating to a temperature of 130°F for 70 minutes. The vulcanization process cures the foxing material, fusing it to both the upper and the outsole, to form a permanent bond around the seam. The last is removed from the shoe after the foxing material has cured. A die cut, latex foam insole may be placed within the upper to conform to the natural shape of the wearer's foot.

In another typical shoe constructed using cold cement, an upper placed within a contoured last and having an ergonomically shaped base portion approximating the shape of the sole of the wearer's foot is cemented to a molded, contoured sole with a shape that corresponds to the base portion of the lasted upper. The sole of such a shoe may include, e.g., an ethyl vinyl acetate midsole and a rubber outsole. The upper for this type of shoe may be formed on and around a last having a contoured shape corresponding to the desired contoured shape for the base portion of the upper.

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## SUMMARY

The present invention relates to a shoe having a sole including a molded, rubber outsole and a molded midsole disposed within the outsole, which midsole may be contoured or shaped to approximate the shape of the sole of a foot. An upper disposed around a last is permanently secured to the outsole using an uncured foxing material fuses to both the outsole and the upper during curing upon the application of a vulcanization process. The upper may have a base portion that will take the shape of a contoured midsole when formed around a contoured last.

Advantageously, the invention features a securely constructed, lightweight shoe. The shoe is easily constructed, and it is shaped to fit the contours of the sole of the wearer's foot using an ergonomic, lasted upper and a lightweight, contoured midsole.

In general, in one aspect, the invention features a molded midsole, which may be contoured or shaped to approximate the shape of the sole of a foot. An outsole including a cored out shell defines a space for receiving the midsole. An upper, which may be formed on a contoured last, has a base panel that is disposed against the midsole to encase the midsole within the outsole, the upper forming a seam around the shoe between the upper and the outsole. A foxing material is disposed around the shoe over the seam to contact the upper and the outsole across the seam. The foxing material fuses to the upper and the outsole upon application of a vulcanization process to permanently secure the upper to the outsole.

Other aspects of the invention may also include one or more of the following features. The outsole may include rubber. The midsole may include polyvinyl urethane or other suitable lightweight material. The upper disposed around the last and the midsole may include a cradle cup heel and a molded arch. The upper may include canvas or polyvinyl urethane. The upper may be formed by stroebel stitching or by stretching the upper around the last. The foxing material may include uncured rubber, and may be in the form of a band. The shoe may include an insole disposed over the base panel within the upper.

In general, in another aspect, the invention features a method of forming a shoe. A molded midsole is disposed within an outsole, which midsole may be contoured or shaped to approximate the shape of a sole of a foot. An upper, which may be formed on a contoured last, is placed over the midsole disposed in the outsole to form a seam between the upper and the outsole. A foxing material is disposed around the shoe over the seam to contact the upper and

the outsole across the seam. The shoe is vulcanized to fuse the foxing material to the upper and the outsole.

Other aspects of the invention may also include the following feature. The last may be removed from the upper after the shoe is vulcanized.

5 Other features and advantages of the invention will be apparent from the description and drawings, and from the claims.

### DESCRIPTION OF DRAWINGS

FIG. 1 is an exploded, perspective view of a shoe according to the present invention.

FIG. 2 is a plane, cross-sectional view of the shoe of FIG. 1.

10 Like reference symbols in the various drawings indicate like elements.

### DETAILED DESCRIPTION

Referring to FIGS. 1 and 2, a shoe 100 according to the present invention includes a lower molded rubber outsole 110. Outsole 110 may be a cored out shell defining a space 115. Outsole 110 may be made of any suitable type of rubber, particularly a rubber providing good gripping and slip resistance when the wearer uses the shoe.

15 Shoe 100 also includes a molded midsole 120. Midsole 120 is shaped to fit within space 115 of outsole 110. The upper portion 125 of midsole 120 may also be contoured or shaped to approximate the shape of the sole of the foot of the wearer of shoe 100. In particular, midsole 120 may have a cradle heel cup 127 and a molded arch 128 for stability, support and customized fit to the wearer's foot. Midsole 120 is preferably made from polyvinyl urethane. Midsole 120 may also be made, e.g., from any suitable blown rubber material. In general, midsole 120 is made from a lightweight material that is relatively lighter and less dense than, e.g., cured rubber.

20 The rubber used to make outsole 110 may wear better and provide better traction than a comparable sole made from the material used to make midsole 120, e.g., a lightweight material such as polyvinyl urethane. The combination of thin, cored out outsole 110 and lightweight midsole 120 disposed within outsole 110 creates a sole that is lightweight and that may be ergonomically shaped with respect to the contours of the wearer's foot.

Shoe 100 further includes an upper 130. Upper 130 may be made, e.g., from canvas, polyvinyl urethane, or any other material appropriate for shoemaking. In particular, upper 130

may be made from any suitable material that fits around and provides comfort to the wearer's foot.

Upper 130 may be formed on and around a last 135, which may have a contoured bottom 132 that approximates the shape of the sole of the wearer's foot. Upper 130 may include, e.g., front, side and rear panels 136, 137, 138, respectively, which are attached to a base panel 139, such as a non-woven material. Panels 136, 137, 138 may be attached to base panel 139 by stroebel stitching, which provides a precise fit around last 135. Alternatively, upper 130 may be formed by stretching and cementing the material of the upper around base panel 139 to surround and take the shape of last 135. Alternatively, last 135 may have a flat bottom. In any event, base panel 139 takes on a shape that corresponds to the shape of last 135.

As shown in FIG. 2, shoe 100 is formed by placing upper 130, including last 135, over outsole 110 and midsole 120. A foxing material 140 is wrapped around the outside of the shoe along a seam 142 formed along the interface between upper 130 and outsole 110 when these elements have been placed together. Foxing material 140 is preferably made from an uncured rubber that adheres to both the rubber material of outsole 110 and the material used to make upper 130. Foxing material 140 may be in the form of a band, e.g., with decorative features on its outer surface. Foxing material 140 preferably contacts both upper 130 and outsole 110 across the seam so that the foxing material may form a complete seal along the interface between the upper and the outsole.

In initially constructing shoe 100, upper 130 may be secured to midsole 120, and foxing material 140 may be secured to upper 130 and outsole 110, using adhesive materials such as cements and primers. Such adhesive materials do not necessarily provide permanent fixation of upper 130 to outsole 110 in a vulcanized shoe. Upon application of a vulcanization process, upper 130, outsole 110, midsole 120, and foxing material 140 are secured together to form an integral assembled shoe 100. In particular, upon vulcanization, i.e., by subjecting shoe 100 to a temperature of 130°F for 70 minutes, the foxing material is caused to cure and fuse to both outsole 110 and upper 130 to permanently secure the elements of the shoe together.

After the foxing material has cured, last 135 is removed from the shoe. Shoe 100 may be further finished by placing an insole or molded footbed 150 over base panel 139 within upper 130. Insole 150 provides additional cushioning and comfort for the wearer's foot.

The resulting shoe 100 of the present invention may have a shape to fit the contours of the sole of the wearer's foot. Shoe 100 is also relatively lighter in weight than prior shoes formed by a vulcanization process because of the lightweight midsole material and absence, e.g., of rubber coring, fillers and/or insole board. The ergonomic features are the result of a contoured last and a contoured midsole.

Other embodiments are within the scope of the following claims.